PARADISE RIVER FIRST CROSSING BRIDGE
(Narada Falls Bridge)
Mount Rainier National Park
Spanning Paradise River at Narada Falls on Service Road
Longmire Vicinity
Pierce County
Washington

HAER No. WA-47

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
P.O. Box 37127
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[Nsrada Fslls Bridge]
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I. INTRODUCTION

Location:	Spanning Paradise River at Narada Falls on service rosd off Nisqually Road, 1 mile SW of Paradise, Mount Rainier National Park, Pierce County, Washington. Quad: Mount Rainier West, Wssh. UTM: 10/593250/5181330
Date of Construction:	1927-1928
Structure type:	Stone-faced reinforced concrete barrel srch bridge
FHwA Structure No.:	9450-006P
Designer and Engineer:	Western Regional Office, Bureau of Public Roads, San Francisco, California
Architectural plans:	National Park Service, Branch of Plans and Design, San Frsncisco, Cslifornia
Contractor:	John D. Tobin, Portlsnd, Oregon
Owner:	Mount Rainier National Park, National Park Service
Use:	Park service road bridge (limited access)
Significance:	The gently-arched Parsdise River First Crossing Bridge sbove Narada Falls is a characteristic "rustic style" bridge of the type commonly employed by the National Psrk Service and the Bureau of Public Roads in the national parks. The reinforced concrete barrel arch bridge is faced in native masonry so as to hsrmonize with the rugged landscape. The entire site development, including the bridge, parking area, comfort ststion, foot trails and scenic overlook, were carefully designed to offer access to the splendid 168' waterfall. The bridge itself never served its original purpose of carrying the Nisqually Rosd, as traffic was subsequently rerouted over the "Narada Cut-Off;" it now provides limited access to the winter operations shed on the east side of the bridge, and trail access to the Narada Falls overlook.
Project Information:	Documentation of the Paradise River First Crossing Bridge is psrt of the Mount Rainier National Park Roads and Bridges Recording Project, conducted in summer 1992 by the Historic Americsn Engineering Record.
	Richard H. Quin, Historian, 1992

II. HISTORY

This is one in a series of reports prepared for the Mount Rainier National Park Roads and Bridges Recording Project. HAER No. WA-35, MOUNT RAINIER NATIONAL PARK ROADS AND BRIDGES, contains an overview history of the park roads. In addition, HAER No. WA-119, NISQUALLY ROAD, contains more specific information on the road off which the structure is located.

Nisqually Road

The "Government Road" or Nisqually Road, built by the U.S. Army Corps of Engineers between 1904 and 1915, was the first road constructed in Mount Rainier National Park. It was designed by Eugene V. Ricksecker, a talented civilian engineer for the Corps' Seattle office, and is remarkable for its sensitive relationship to the magnificent park landscape. The road climbs on a steady grade not exceeding 4 percent from Longmire to Paradise, taking in fabulous vistas and providing access to old-growth forest, waterfalls, a retreating glacier, and finally, the lush subalpine meadows of Paradise Valley. Although reconstructed in the 1920s, the road still follows the original route for most of the distance to Paradise. The road is the principal thoroughfare in Mount Rainier National Park and the only park road maintained for winter travel.

The 18.4-mile Nisqually Road begins at the Nisqually Entrance, seven miles east of Ashford, Washington. It is a continuation into the park of the old "Mountain Highway" from Tacoma, now numbered as State Highway 706 outside the park boundaries. After passing the reconstructed "rustic style" entrance arch and log entrance station, the road continues east through stands of enormous old-growth trees, reaching Longmire at mile six. It stays on the northwest side of the Nisqually River and continues northeast to a crossing of Van Trump Creek at the Christine Falls Bridge [HAER No. WA-48]. From there, the road runs east to cross the Nisqually River at the Glacier Bridge [HAER No. WA-61], then climbs and loops back to the southwest to Ricksecker Point. The main road follows a 1921 cut-off road here; the old road ran around the outer edge of the point. Running generally west again, the Nisqually Road reaches Narada Falls. Here again, the main road now follows the route of another 1921 cut-off road; the old route, which crossed the Paradise River First Crossing Bridge and climbed a series of switchbacks to Inspiration Point, has been abandoned. From Narada Falls, the present road loops through the marshy bogs of Frog Heaven and then turns northwest onto a modern (1958) road segment for the final approach to Paradise Valley. The old road is met again near the Paradise Inn, where it runs east and south as a one-way road, crossing the rustic Edith Creek [HAER No. WA-46] and Paradise River Fourth Crossing [HAER No. WA-45] bridges before dropping to Inspiration Point. For its final segment, the Nisqually Road turns east again to cross the Paradise River Second Crossing Bridge [HAER No. WA-62] and just beyond, a juncture with the old road.

Paradise River First Crossing Bridge

The First Crossing or Narada Falls Bridge spans the Paradise River above Narada Falls, the largest waterfall accessible by the Mount Rainier National Park road system. This popular cascade is one of the most visited sites in the national park. The 168' waterfall was given its name on 24 August 1893 by Arthur F. Knight of Tacoma during a week-long visit to the park by the Narada Branch of the Theosophical Society of Western Washington.[1] The Theosophists, while en route to Paradise Valley, became enthusiastic about the unnamed waterfall, and gave the name of the branch chapter to the cascade. "Narada" was the name of a Hindu guru, or philosopher/priest. *Grater's Guide to Mount Rainier National Park*, published in 1949, states the waterfall was discovered

by the party,[2] but being the first principal obstacle in the Paradise River valley, this seems somewhat unlikely.

The First Crossing Bridge (so named because the bridge was the first of several spans across the river) was designed to carry the Nisqually Road, but following the completion of the Narada Cut-Off in 1926, it was relegated to use as a service road bridge and pedestrian bridge providing access to the east side of the river and the Narada Falls viewpoint.

Eugene Ricksecker's initial proposal for the "Government" (Nisqually) Road called for a long high bridge across Paradise River below Narada Falls. This 240' structure would have had a center span of 80'. Ricksecker suggested that the structure should be of steel or reinforced concrete construction.[3] However, a site above the falls was adopted instead, and in 1908 a 33' wooden Howe deck truss bridge was built at a cost of $1,200.* This evidently was a substantial structure, as an historic photograph in the Mount Rainier National Park Archives shows the bridge carrying a dead load of at least ten feet of snow.[4] The road was extended beyond the bridge to Paradise Valley in 1910, and opened to automobile traffic in 1915.

The section of the Nisqually Road between the Nisqually Glacier Bridge and Narada Falls was operated under a traffic control system between 1915 and 1922. Automobiles were permitted to travel uphill or downhill over the section only at specified times. A 10' x 12' frame cabin was constructed at Narada Falls to house the traffic control ranger. (L. D. Boyle was the first to serve at Narada Falls).[5] This structure is no longer extant, and its exact location was not identified in the recording project. A parking area was constructed for waiting vehicles.

The Howe truss bridge at the falls remained in use until the 1920s reconstruction of the Nisqually Road. Following the takeover of the project administration by the Bureau of Public Roads, a decision was made to replace the bridge with a new stone-faced reinforced concrete arch structure. Plans and specifications were drawn up by the BPR's Western Regional Office in San Francisco, California. The National Park Service Landscape Engineering Division, also based in San Francisco, advised on and approved the designs for the structure.

The bridge project was combined with the construction of the new Christine Falls Bridge and advertised as a single contract. Bids for the project were opened at the District 1 Office of the Bureau of Public Roads in Portland, Oregon on 20 July 1927. Based on his low bid of $22,468 for the two bridges, Portland contractor John D. Tobin was awarded the contract by the Department of the Interior on 6 August.[6]

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* The First Crossing Bridge should not be confused with the "Horseshoe Bridge" described in reports as located "above Narada Falls." This was a high wooden trestle carrying the road over and partly around a helix or spiral loop (a method of gaining elevation in a constricted area between two slopes) with a 50' radius. Another photograph in the park collection indicates this structure had a wooden deck and rustic timber railing. This unusual structure was swept away by a rockslide in the winter of 1915 and replaced the following summer with a high rock embankment. ("Notes on the Construction of the Rainier Park Road," MSS, n.d. (1911). MORA Archives, Box H14, Road Reports 1907-1913; Dewitt L. Reaburn, Supervisor, Mount Rainier National Park, Supervisor's Monthly Report, May 1916, 2; Supervisor's Monthly Report, August 1916. MORA Archives, Box H2615, Superintendents' Monthly Reports 1913-1919 file.)

BPR engineers estimated that the following materials would be required for the bridge's construction:

Class "D" concrete	110 cu. yds.
Reinforcing steel	22,000 lbs.
Spandrel fill	200 cu. yds.
Rubble masonry	60 cu. yds.
Waterproofing	130 sq. yds.
Excavation (removed)	50cu. yds. [7]

As the above quantities were estimates, adjustments were likely made in the field to suit site considerations.

Work began with excavations for the abutments. The foundations were dug to solid rock, which was then drilled about 2' 6" deep. One-inch square deformed steel bars were grouted into the holes, and then the abutment concrete was poured against the exposed rock face. The stub foundations rest on three broad steps to spread the weight of the heavy structure.

As the abutment work was nearing completion, crews began erecting timber falsework to support the arch ring stones or voussoirs. These were then erected on the falsework, and the final forms were put in place for the arch barrel or inner face. The arch ring was a structural element, not just a stone facing; the arch concrete would be poured against its inner face, so it also served as the formwork for the sides of the reinforced concrete arch. The voussoirs and keystones were individually selected and cut to fit in place, with their widths determined at half their height. Each was fitted with 3' hooped #6 gauge galvanized iron cramps to facilitate bonding with the concrete. These cramps were grouted into drilled holes in the voussoirs, leaving the hooped ends extending 18" towards the center of the structure.

The structural steel was placed next. According to construction drawings, this consisted of deformed mild open hearth deformed bars of structural grade. The longitudinal bars were 1" square dimension and were placed on 8" centers. Latitudinal bars were 1/2" square, and set on 2' centers on top and bottom of the arch.[8]

No pouring diagram was included on the construction drawings, so the following sequence of pours is a conjecture based on the construction of similar bridges in the park. The aforementioned abutment concrete having already been placed, concrete would then be poured for the crown of the arch, and finally, the sections over the haunches of the arch. These short sections served as construction keys, helping tie the other concrete sections together.

Once the concrete had cured, a waterproofing membrane was applied to all surfaces that would come in contact with the spandrel fill. Wing walls and spandrel walls were constructed from broken range granite rubble masonry. Project specifications stated that care was to be exercised to use weathered stones so as to "present a rugged appearance."[9] All stones were to be laid with their longer face horizontal. No more than 10 percent of the stones in each course were to be the same size, but there should also be no considerable contrast in the size of adjacent stones. The earthen fill was then placed and compacted, and the curb stones were set for the 2' 11" sidewalk on the north side of the bridge. As the final part of the project, the stone parapet or guard walls were completed. The roadway and sidewalk were surfaced under a separate contract.

In early June 1928, the site was investigated by National Park Service Assistant Landscape Architect Ernest A. Davidson. Davidson was considering the location of a new access road to the parking area from the Nisqually Road.

In his report to NPS Chief Landscape Engineer Thomas C. Vint, Davidson offered two alternatives. Roadway "A," a two-way route, would parallel the west bank of the Paradise River and would run a quarter mile or so northwest to join the highway. Alternative "B" was a short, one-way route climbing a slope to meet the highway at the end of a hillside island separating the highway from the parking area.[10] In the end, this second alternative was adopted, and is now the north entrance roadway to the development.

The Paradise River First Crossing and Christine Falls bridges were completed on 20 June 1928 and accepted by the Bureau of Public Roads. Superintendent Tomlinson called them "very attractive and appropriate for the surroundings," and reported that much favorable comment was being received from visitors.[11] Paul Sceva, general manager of the Rainier National Park Company, called it "the most beautiful bridge I ever looked at."[12]

The bridge never carried the Nisqually Road for which it had been designed. In 1921, the National Park Service began construction of the "Narada Cut-Off," This by-pass road followed the northwest bank of the Paradise River, then swung east, crossing the river on the new Second Crossing Bridge [Narada Cut-Off Bridge, HAER No. WA-62], a quarter mile northeast of the First Crossing. The cut-off continued to Inspiration Point and a junction with the old route. The old road continued in use until a section near the base of the switchbacks was swept away by a rockslide in 1926.[13] The plans for the First Crossing Bridge originally noted that the road continued to Paradise; however, the park's field copy has this destination crossed out and replaced with "Dead End Road."

The parking area at the bridge site was enlarged in 1933 to provide for increased parking for winter travelers. The work involved construction of a new masonry wall and backfilling to provide for 5,500 more square feet of parking space. Construction started on 1 October 1933 and by the end of the year, the project was complete except for completion of the guard rail.[14] Work was completed on 10 October 1934. The fill material was taken from the face of a high cut at Ricksecker Hill and from a sharp curve on the Miller Cutoff.[15] The project was funded by the Public Works Administration and labor was performed by Emergency Conservation Works program personnel. ECW Camp No. 1 was located at Narada Falls.[16]

A new winter operations shed was constructed to the east side of the bridge in 1938.[17] Three years later, the National Park Service and the Civilian Conservation Corps jointly constructed a comfort station and warming room between the shed and the bridge. Designs for the comfort station were prepared by the NPS Branch of Plans and Design and approved by now-Chief of Planning Thomas Vint.[18] The one-story rustic style structure was constructed with stone masonry extending to the window level, timber posts, and heavy timber rafters to support the slightly pitched roof. The First Crossing Bridge now carries a service road to these structures and also provides pedestrian access to the Narada Falls viewpoint and to the Lakes Trail to Paradise.

The bridge road surface has been regraded on the east side to provide a level approach to the adjacent maintenance area. This work buried the east wing walls and parapets. The bridge retains much of its general historic appearance; however, this change eliminated the humped crown that was the unique characteristic of the structure.

Accidents happen. On 17 March 1954, Delores Van Parys, 17, fell from the parapet wall a distance of 179' over the falls, landing beyond the base. She was rescued by park rangers and some Air Force personnel who were on the spot. She was carried to the hospital at Morton, where it was learned that she had

suffered a concussion, internal injuries, a spinal injury and abrasions and bruises. The spinal injury at first caused some paralysis, but after a few days she began to recover.[19]

A bridge safety inspection conducted by the Federal Highway Administration in September 1975 reported the bridge in good condition, requiring only minor maintenance, namely, the repointing of the masonry walls for one abutment. The report noted that the deck geometry, bridge railing and approach alignment did not meet current safety standards, but recommended no action be taken. The H-15 load design (adequate to bear two 15-ton trucks) was considered adequate for existing use.[20]

Due to a failure of some 50 linear feet of the masonry guard wall at the falls, the wall was rehabilitated in 1984.[21] The new masonry work was done to match the existing wall, and the repairs are today undiscernible.

The Narada Falls development, including the bridge, the parking area, the foot trail and the overlook, is one of the most popular destinations in Mount Rainier National Park. Only 150' from the road, Narada Falls is the largest waterfall accessible by car in the park and one of the most impressive. Developments at the site were carefully planned by the National Park Service's Landscape Engineering Division to integrate with the site. The bridge and adjacent retaining walls are faced with or constructed in native granite that blends with the surrounding rock outcroppings. Large boulders and a rustic split-rail fence line the trail to the viewpoint, which meanders through a splendid copse of huckleberries and mountain blueberries. The landscape naturalization work done by the CCC is still apparent, as the native species which were planted--Douglas fir, western hemlock, and redcedar--are now matured.

DESCRIPTION

The Paradise River First Crossing Bridge is a stone-faced reinforced concrete barrel arch structure faced in native stone, and is characteristic of Mount Rainier's many splendid "rustic style" spans. Measuring 63' in length and 31' wide, it carries two 10' roadway lanes and a single 2' 11" sidewalk on the upstream side. The bridge spans Paradise River on a single semi-elliptical arch with a 36' clear span. This shallow arch rises only 7' from the spring line and just another 2' or so from the water line. The structure's wing and spandrel walls are built from broken range granite masonry, and the gently cambered guard rail is of solid stone construction. Grading and resurfacing of the bridge has greatly reduced the original rise at the crown of the arch on the east side, and where the roadway once crossed on a rise following the contour of the arch, it now crosses the structure on a fairly level grade. The bridge was rated for two fifteen-ton trucks plus 30 percent for impact, with a design allowance of 25 pounds per square foot of roadway for future wearing surfaces.

The bridge is part of a larger development, and provides access for service vehicles to the comfort station and winter operations sheds on the east side of the bridge, as well as pedestrian access to the Lakes Trail and the Narada Falls overlook. The large semi-triangular parking area is supported on a high stone retaining wall and embankment, which tapers to join the Nisqually Road's parapet wall to the southwest. The parking area is separated from the highway by a wide island on a steep slope. The Paradise River approaches from the northeast, turns due south under the bridge, and then drops 168' over the falls into a rock-strewn splash pool. Regrouping below the falls, the river continues southwest to a confluence with the Nisqually River.

III. ENDNOTES

1. A synchrestic theosophy following certain Hindu philosophies was associated with the movement which surfaced in the United States in 1875. These Theosophists aimed to serve through "societies" as a nucleus of a universal brotherhood of man. (*Webster's Third*, III:2371.) The party also named Alta Vista and Theosophy Ridge at Paradise Valley.

2. Russell K. Grater, *Grater's Guide to Mount Rainier National Park* (Portland, OR: Binfords & Mort, Publishers, 1949), 35.

3. Eugene V. Ricksecker, Assistant Engineer, U.S. Army Corps of Engineers, "Road to Mount Rainier," MSS, n.d. (1904). MORA Archives, Eugene Ricksecker Letter Book.

4. "Photo of Bridge Above Narada (2nd Crossing)", photograph 7655/600, n.d., in MORA Archives, Box H14, Ricksecker file, 1904-06. (N.B. Bridge was constructed later, 1908).

5. Arthur D. Martinson, *Wilderness Above the Sound: The Story of Mount Rainier National Park* (Flagstaff, AZ: Northland Press, 1986), 40; Erwin N. Thompson, *Mount Rainier National Park, Washington: Historic Resource Study* (Denver, CO: National Park Service, Denver Service Center, 1978), 147.

6. E. C. Finney, First Assistant Secretary of the Interior, to J. D. Tobin, Portland, OR, 6 August 1927. National Archives, RG 48 Box 1991, file 12/7.

7. U.S. Department of Agriculture, Bureau of Public Roads,"First Paradise Arch over Paradise River, Nisqually Road--Paradise Section, Mount Rainier National Park, Pierce County, Washington," construction drawing P-12-4 (San Francisco, CA: Bureau of Public Roads, 16 June 1927). Engineering Division files, Mount Rainier National Park.

8. Bending diagram and general plan on Ibid..

9. "General Notes," in *Ibid*..

10. Ernest A. Davidson, Assistant Landscape Architect, National Park Service, Mount Rainier National Park, to Thomas C. Vint, Chief Landscape Engineer, National Park Service, San Francisco, CA, 4 June 1928. National Archives, RG 79 Entry 22 Box 18.

11. O. A. Tomlinson, Superintendent, Mount Rainier National Park, Superintendent's Monthly Report, June 1928, 6. MORA Archives, Box H2615, Superintendents' Monthly Reports 1927-1931 file.

12. Note on Narada Falls plan (sketch), n.d. National Archives, RG 79 Entry 22 8ox 18.

13. Thompson, 198-99; Tomlinson, Superintendent's Annual Report, 1924, 1. MORA Archives, Box H2621, Superintendents' Annual Reports 1917-1925 file. Parts of the retaining walls for old switchbacks can still be discerned from the Narada Falls Overlook and at Inspiration Point.

14. C. E. Drysdale, Resident Engineer, Mount Rainier National Park, "Report on Construction Activities, 1933," 40. Typed MSS, MORA Archives, File D30, Narada Falls Parking Area.

15. Idem,"Report on Construction Activities, 1934," 43. Typed MSS, MORA Archives, File D30, Narada Falls Parking Area.

16. R. D. Waterhouse, Associate Engineer, Mount Rainier National Park. "Final Construction Report on Complete Parking Area--Narada Falls, P.W.A. Project No. 201.8," 1-2; Idem, "Final Construction Report on Complete Parking Area--Narada Falls, Project No. E.C. 501B," 1-2. MORA Archives, File D30, Narada Falls Parking Area.

17. Thompson, 201.

18. G. Gray Fitzsimons, Historian, National Park Service, Pacific Northwest Regional Office, Inventory form for Narada Falls Comfort Station, P-010, Mount Rainier National Park Cultural Resources Survey, 23 July 1982.

19. Curtis K. Skinner, Acting Superintendent, Mount Rainier National Park, Superintendent's Monthly Report, March 1954, 4. MORA Archivee, Box H2621, Superintendents' Monthly Reporte 1953-1955 file.

20. U.S. Department of Transportation, Federal Highway Administration, "Bridge Safety Inspection Report, Narada Falls Bridge, Mt. Rainier National Park Structure No. 9450-006P" (Denver, CO: Federal Highway Administration, Region 8 Office of Western Bridge Design, September 1975), 1.

21. Chuck Blasick, Civil Engineer, to Walt Manza, Chief of Maintenance, Mount Rainier National Park, 8 February 1984. MORA Archives, File D30, Narada Falls Parking Area.

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